ACCESSION #: 9805210088

NON-PUBLIC?: N

LICENSEE EVENT REPORT (LER)

FACILITY NAME: LaSalle County Station, Unit 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000373

TITLE: Unit 1 Primary Containment Isolation and Scram Due To

Switch Failure

EVENT DATE: 12/12/94 LER #: 94-015-01 REPORT DATE: 05/15/98

OTHER FACILITIES INVOLVED: LaSalle County Station, DOCKET NO: 05000374

Unit 2

OPERATING MODE: 1 POWER LEVEL: 092

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Rusell Gremchuk, System Engineering TELEPHONE: (815) 357-6761

Extension 2809

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: SB COMPONENT: IBISSW MANUFACTURER: S382

REPORTABLE NPRDS: Yes

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On December 12, 1994, Unit 1 was in Mode 1 (Run) at 92% power. At 2132 hours, a Group 1 Main Steam Isolation Valve (MSIV) Primary Containment Isolation (PCIS) occurred due to a spurious Main Steam Line (MSL) High Flow signal on one PCIS

channel while a calibration was being performed on the other channel. The closure of the MSIVs caused the Reactor to scram. All control rods fully inserted. Three Safety Relief Valves (SRVs) lifted and reset at appropriate pressures. Two additional scram signals were generated due to reactor level perturbation caused by the manual operation of SRVs to control reactor pressure.

The cause of the scram was a Group 1 Isolation signal initiated by the spurious trip and reset of MSL High Flow switch 1E31-N009C. This occurred during the performance of Instrument Surveillances LIS-MS-102 and LIS-MS-302. Investigation determined the 1E31-N009C Static-O-Ring Switch had failed. This switch was replaced. The failed switch was disassembled and inspected to determine the cause of failure. The cause of the failure was oil contamination of an internal switch assembly. Due to the age and isolated nature of the failure, the root cause can not be determined.

While performing a review of documents, it was discovered that an NTS item tracking the generation of a supplemental LER had been closed without submission of the required supplement.

This report is being submitted per 10 CFR 50.73(a)(2)(iv) due to an automatic actuation of the Reactor Protection System.

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PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor, 3323 Megawatts Thermal

Rated Core Power

Energy Industry Identification System (EIIS) codes are identified in

the text as [XX].

A. CONDITION PRIOR TO EVENT

Unit(s): 1 Event Date: 12/12/94 Event Time: 2132 Hours

Reactor Mode(s): 1 Power Level(s): 092 RCS [AB] Temperature:

Unit 1, 543 Degrees F

Mode(s) Name: Power RCS [AB] Pressure:

Operation Unit 1 993 psig

B. DESCRIPTION OF EVENT

While performing a review of documents, it was discovered that an NTS item tracking the generation of a supplemental LER had been closed without submission of the required supplement. Personnel involved with the closure of the documents have no recollection of the reasons for closure, or have departed the station and are not available for comment.

On December 12, 1994, the Instrument Maintenance Department (IMD) was performing Instrument Surveillances LIS-MS-102 and LIS-MS-302, "Unit 1 Main Steam Line (MSL) High Flow MSIV Isolation Calibration/Functional Test", when a Group 1 Main Steam Isolation valve (MSIV, MS) [SB] Primary Containment Isolation (PCIS, PC)[NH] was received. The surveillances had been performed on three of the four instrument channels (A, B, and C) that input to the PCIS logic. During the surveillance prior to the scram, the 1E31-N009B switch was taken out of service because it did not pass the surveillance requirements. Only two switches per line are required to be operable. The IMD Technicians were starting the fourth channel (D) when the isolation occurred.

There are four instrument racks, and each instrument rack contains one PCIS sub-channel. Each PCIS sub-channel consists of four flow switches. These sub-channels are A1 (A switches), B1 (B switches), A2 (C switches), and B2 (D switches). The switches are configured

in a one-out-of-two twice logic. This logic requires an A or C switch actuation and a B or D switch actuation in order to complete the isolation logic. To trip a PCIS sub-channel from the high flow switches, at least one switch in a channel must trip on high flow. To actually receive a Group 1 isolation, one of the A or C channels must trip along with one of the B or D channels. This is a one out of two taken twice logic arrangement. At the time of the surveillance, the IMD Technician had actuated the D channel logic with the 1E31-N008D flow switch and was in the process of returning the channel to normal. During this time, a spurious isolation signal was received from the C channel logic that resulted in a Group 1 isolation.

After the scram, the initial investigation into the cause of the spurious signal revealed that the 1E31-N009C switch was not showing repeatability. The switch was tested eight times and would not trip consistently within the required tolerances of the surveillance. The normal setpoint is 103 plus or minus 1 PSID. The switch was declared inoperable and taken out of service. At this point, both the 1E31-N009B switch (which had failed earlier in the testing sequence) and the 1E31-N009C switch were replaced with new switches that had been characterized. Characterization is the process in which each individual switch's acceptance is determined, based on

static shift and repeatability, by the statistical analysis of switch calibration data. The characterization process is governed by LIP-GM-956, "Analysis of Static-O-Ring Differential Pressure Switch Data". The failed switches were brought back to the Instrument maintenance shop for further diagnostic testing. A test rig was made utilizing a GE HFA relay and a power supply along with the Static-O-Ring (SOR) characterization rig. The SOR rig allowed the cycling of the flow switch at approximately 1000# static line pressure with the necessary differential pressure. The HFA relay and the power supply made it possible to simulate the electrical load the failed switches normally see in the plant.

Subsequent testing on the 1E31-N009C switch, which had been removed, demonstrated some unusual electrical characteristics. Both before and after the switch was cycled, the flow switch contacts developed an oscillating voltage drop. Although the voltage drops varied in amplitude and duration, it was evident that the possibility existed for the drop to be long enough and of a large enough amplitude to drop out the PCIS subchannel relay.

To determine if any other flow switches demonstrated this phenomenon, special test LST-94-092, "Unit 1 SOR Test" was written to monitor the contacts of the installed flow switches while the IMD performed functional tests. Chart recorders were connected across each flow switch contact at the instrument rack, and left running.

The IMD performed functional tests and the results were reviewed in conjunction with the data from LST-94-092. A search of archives records could not locate an executed copy or a set. of the associated chart recorder printouts. Following review of these tests, was determined that switch 1E31-N008D was suspect and warranted replacement. The switch has been replaced.

The failed switch (1E31-N009C), was and inspected at the manufacturer's facility to determine the cause of the failure. The results of this investigation indicated that the failure was due to oil contamination of the switch internal parts. SOR (the manufacturer) believes that the source of the oil contamination was "the end customer's application". This device was used in a Main Steam system which does not contain oil. LaSalle County Station does not use oil in the calibration or adjustment of these switches. The microswitches

are "potted" and are not replaced at the station or by ComEd personnel, therefore the supposition by the manufacturer that the "the end customer's application" was the source of the contamination is without basis or foundation. A more likely source of contamination was the manufacturer of the microswitch, but no evidence exists to show that SOR pursued that failure mode.

Based on the low number of SOR switch failures in the same or a

similar manner internal oil or other contaminations it appears as though this isolated failure does not warrant a change in the procedures or processes involved in the calibration, installation, or testing these switches.

C. CAUSE OF EVENT

The cause of the scram was a Group 1 Isolation signal initiated by the spurious trip and reset of the 1E31-N009C MSL high flow switch, during the performance of Surveillances LIS-MS-102 and LIS-MS-302. The root cause of the failures in the same or a similar manner (internal parts causing variations in contact resistance; the methods by which the oil entered the switch is indeterminate. A review of LaSalle County Station and NPRDS/ EPIX / OPEX databases for a similar failure mode of an SOR switch provided no like occurrences.

D. SAFETY ANALYSIS

The safety consequences of the event were minimal. The Primary Containment Isolation System functioned as designed when a high flow isolation signal is received. The spurious trip of MSL High Flow Switch 1E31-N009C acted in the proper manner and, in conjunction with the IMD Surveillance, initiated the isolation. All isolation actions were initiated and completed as designed.

E. CORRECTIVE ACTIONS

1. Immediate Corrective Actions

a. The immediate corrective actions were to recalibrate the "C" channel high flow switches. (Closed)

b. While performing calibration, switch 1E31-N009C was found non repeatable. The switch was taken out of service and replaced. (Closed)

2. Actions to Prevent Recurrence

a. A special test procedure, LST-94-092, was written and performed to verify that the remaining Main Steam Line High Flow Switches operated properly. (Closed)

b. All Main Steam Line High Flow Switches were functionally tested to demonstrate operability. (Closed)

c. Since LaSalle County Station is currently in an extended outage, a WR (WR 980036797) as been generated to check contact resistance and verify operability of MSL High Flow Signal switches. These actions will be completed prior to restart from L1F35.

No further action is recommended at this time for the switches.

The NTS system has been revised and strengthened since the closure of this item, to require substantive documentation in order to close an NTS item. In this case, there was no documentation to support the closure, as was discovered in

the subsequent review. (Closed)

No further action recommended at this time.

F. PREVIOUS OCCURRENCES

LER NUMBER TITLE

86-009-00 Main Steam High Flow Group I Isolation/Scram.

(DVR 1-2-86-0033)

G. COMPONENT FAILURE DATA

Manufacturer Nomemclature Model Number Mfg. Serial Number

SOR (Static

0 Ring) Pressure 102AS-B403-NX- 86-10-558

Differential CIA-JJTTXG

Switch

*** END OF DOCUMENT ***